What Do IT-People Know About the Nordic History of Computers and User Interfaces?

A Preliminary Survey

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Abstract: This paper reports a preliminary, empirical exploration of what IT-people know about the history of computers and user interfaces. The principal motivation for the study is that the younger generations such as students in IT seem to know very little about these topics. The study employed a free association method administered as email. Eight students and four researchers participated, between 26-34 and 48-64 years of age, respectively. Responses totaled 222 and we analyzed and categorized them. First, the Nordic touch was extremely limited. Secondly, the knowledge of both students and researchers seems heavily based on personal experience so that the researchers know much more about the earlier days of computing and interfaces. Thirdly, there is a tendency amongst the students to conceptualize the history of *computers* in *interface* features and concepts. Hence, the interface seems to become the designation or even the icon for the computer. In other words, one of the key focal points in the area of human-computer interaction: to make the *computer* as such *invisible* seems to have been successful.

Keywords: User interface history, computer history, knowledge

1. Exploring User Interface History

In the last years, I have become interested in the history of user interfaces to computers [4, 5]. My motivation is primarily the scarcity of the literature on this topic and a strong impression that young IT-people know very little about the history of user interfaces – and apparently also about the history of computers. They seem to believe that the PC was the first computer and that Windows was the first user interface. My exploration of the history of user interfaces is fascinating, and being a newcomer with a background in computer science and human-computer interaction (HCI), I have to adopt historians' practices and discourses [3].

The target audience for my research in user interface history consists of three main segments: historians of technology, researchers in IT and HCI, and students of IT and HCI. In accordance with good practice in HCI – know thy user – I would like to know more about the target audience. Getting to know the historians' practice and discourse takes place through networking and studies of

the literature. I do know IT-researchers and IT-students quite well in general, but my understanding of their knowledge of the history of computers and interfaces is rudimentary. Therefore, I conducted an exploratory survey of what the two groups know about these topics. This will help me sharpen my research questions and communicate my results more succinctly.

2. Probing Researchers' and Students' Knowledge

Given the nature of this unchartered territory, I included the broader history of computers in order to contextualize the interface issue. As computing is an international phenomenon I decided only to address the Nordic touch implicitly. I employed an open-ended data collection method: free associations. In addition, I recruited informants in my immediate vicinity. The researchers were four colleagues: two university researchers and two from industry with considerable research experience. They were all computer scientists and knowledgeable or experts in HCI, between 48 and 64 years of age. I recruited the students among the ones I supervised at the master level at the IT University in the fall of 2006. I asked fourteen students and received eight answers. Their median study time at the IT University was 1.5 years. They all had a baccalaureate degree in various areas, including media technology, IT-studies, and Danish. Their age varied between 26 and 34 years. The specific wording of the free association task was as follows.

> *Please complete a brief, free association task on the following question:*
> *When I say the history of computers, what do you say?*
> *Write down 5-10 points, names, events, systems, paradigms, etc.*

There was a similar question on the interface. I administered the survey by email. The respondents returned 222 answers, on average 28 for the researchers and 14 for the students, about equally distributed between computer and interface history.   The respondents spent between 10-15 minutes and one hour in responding. One respondent in each group returned a 1-page essay, while the remaining respondents returned a list of words or short statements. The lengthy responses were condensed. I categorized all answers twice, with several weeks between to achieve some robustness (inter-rater reliability over time), in categories derived from the data that reflect major historical aspects.   The Appendix lists all the responses in abbreviated form, enabling the reader to get an impression of the breadth and diversity of the material.

3. What Do They Know?

A summary of the results appears in Table 1. In the following, I present and discuss the three most noteworthy trends.

The numbers are absolute because of the almost equal number of responses in the four groups. Note that I scored the two last rows independently of the rows above.

Table 1: Responses in categories listed alphabetically, blank cells denote no response.

Category	The History of the Computer		The History of the User Interface	
	Researchers	*Students*	*Researchers*	*Students*
Applications	3		3	1
Games		3		
Evolution	6	7	3	3
Internet	1	3	1	2
Miscellaneous	4	1	2	1
Organizations	1	5		1
Personal computer	5	18	2	1
Pioneers	6	1	3	1
Research			7	
Society	2	2		
Software	8	3		6
Technology	11	5	4	2
Use & User	3	1	6	2
User Interface	4	11	27	30
Total	*54*	*60*	*58*	*50*
Nordic		2	1	1
Pre-pc	36	7	23	9

Firstly, the *Nordic touch* is modest, in fact only four responses out of 222 (1.8%), as seen in the second-to-last row. The responses were:

o The Danish PC Piccoline manufactured by Regnecentralen from 1984 to 1989
o The Danish Computer Fair in Copenhagen
o A user interface development method by the Danish researcher Søren Lauesen
o Jakob Nielsen's alertbox at www.useit.com

These examples do not lend support to a strong Nordic anchoring as the Computer Fair was probably much like computer fairs in other countries and Jakob Nielsen is indeed Danish but has been living in the United States for several decades[1]. The limited Nordic touch is in line with the decline of the Nordic IT industry in the last decades. Thus, in Denmark, the best-known IT-company Regnecentralen closed in 1992 after two decades of organizational and financial

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[1] In fact, students often ask me if he is Danish or American.

turbulence [6]. Hence, it seems that knowledge of computer and user interface history is strongly internationally grounded.

Secondly, there is a marked difference in the responses in the two groups regarding the *user interface*. Consider first the following student response: Machintosh[2], Xerox Parc, GUI, Window metaphor, Desktop metaphor, Microsoft, DOS. Note that the first five of these seven items are canonical user interface concepts. Is this a response to the history of *computers* or to the history of *user interfaces*? It is the former, in fact. This student was extreme, but student responses on user interfaces to the question on computer history were much more frequent than researcher responses (11 versus 4). Hence, students seem to associate computer history much more strongly to the user interface than researchers. This trend is in line with a recent terminological shift towards use of the term user interface at the expense of the term computer. An example from a recent Ph.D. thesis is, "We become part of the interface or rather we bring the interface with us everywhere, we create practices around the interface" [1, p. 88]. Contrasting this, it is interesting to note that the students have far fewer answers in the category use and user (3 versus 9), perhaps because students are brought up with computers and therefore consider user-trouble an inherent and inevitable part of the game?

Thirdly, there is a very marked difference between the researchers and the students regarding the emphasis on *personal computers* in the history of computers. Here the students' responses are almost four times more frequent than the researchers' (18 versus 5). This trend is supported by looking at pre-PC responses in the bottom row. Only 7 and 9 of the students' responses are pre-PC, while the corresponding figures for the researchers are 36 and 23. Hence, there is strong evidence that the students seem to associate computer history with the PC era. Given that in the last two decades or so with client-server architecture, access to mainframe computers happens through PCs and not through "dumb" terminals, it is not surprising that students have little clues about large computers, let alone about their origin. Nevertheless, modern computer users are using more computers and more powerful computers than ever before. Surfing on the internet means using myriads of small and large computers, networks, and protocols – yet the computers are largely invisible. The interface appears to connect the user to other users and the vast amount of information and services. The technology itself has become hidden while the interface has come to the fore [4]. Hence, one of the key focal points in the area of human-computer interaction: to make *invisible* the *computer as such* seems to come closer to realization.

4. Conclusion

First, the Nordic touch was extremely limited as only four of 222 responses addressed the Nordic aspects. Secondly, the knowledge of both students and researchers seems heavily based on personal experience so that the researchers

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[2] Spelling error in original response.

know much more about the earlier days of computing and interfaces. Hence, this study suggests that historical knowledge on computers and user interfaces is relative and associated with generation-specific personal experiences. Thirdly, there is a tendency amongst the students to conceptualize the history of computers in interface features and concepts. Hence, the interface seems to become the designation or even icon for the computer. We should interpret these conclusions with considerable caution due to the very small sample of IT-people recruited in my work context and the open-ended data collection method. The study is an indication of the lie of the land and may serve as a point of departure for future work.

After the study, an interesting twist emerged. It turned out that three of the four researchers did not know about the changing meaning of the term *computer* in the 1940s—from denoting a *person* doing calculations manually to denoting a *digital calculation devic*e [2] nor did several of them know that many of the first programmers were *women*. Indeed, this is a strong illustration of the above-mentioned generation-specific and experience-based knowledge of computer and user interface history.

References

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Appendix

The 222 responses appear below in alphabetical order. They are organized according to Computer History Researchers, Computer History Students, Interface History Researchers, and Interface History Students. The original responses have been condensed in many cases while preserving the gist of the response.

Computer History Researchers	Alan Turing	Compilers for high-level
	Alan Turing	languages
	Alan Turing	DOS
2. 3. 4. and 5. generation	Apple II	Edsac/Eniac
programming languages	Basic	Eniac
administrative systems	Citizens required to use IT	ferrite core

few and privilied users to
  everyone everywhere
Fortran
Hopeless operational
  procedures in embedded
  software, eg in DVD
  players
Hype and sales talk
IBM
IBM 3270
IBM pc
IBM/360
IBM OS/360
IBMs waterfall model
Internet
John von Neuman
John von Neuman
levels in systems and
  architectures
Macintosh
mainframe – mini – micro
  computers
mainframes
mainframes
microcomputers
Microsoft overtook IBM on
  the pc market
minicomputers
numerical calculations
operating systems
pc
pc
pc/Mac
pc-revolution
PDAs
process control
punched cards
punched cards
smaller and smaller
specialist to routine tasks
  for ordinary users
superstition and
  incompetent support
system development
the computer: an everyday
  appliance
ubiquitous comp.
Univac
user trouble
vacuum tubes to transistors
Vannevar Bush

Computer History Students

Alan Kay
Amiga 500
Apple

Arpanet
Atari, Commodore 64
Commodore 64 game
  console
Commodore 64 games
Commodore 64
  programming
Commodore 64 tv and
  casette tape
Computer Fair in Bella
  Center
Computer technology: IO
  to silicone chips etc.
Desktop-metaphor
Diskette development from
8" til 3.5" to CD etc
Displays: from large and
  clumsy to flat, less bulky
DOS
DOS: this weird,
  impoverished place
Ethernet
Game consoles: Amiga,
  Sega, Nintendo
GUI
HTML – opened up with
  Flash etc – had not
  happened since LEGO
IBM
IBM
IBM
Internet – the computer
  becomes much more
  interesting
large computers
Machintosh
Macintosh: the first that my
  dad had in his office
matrix printer
Microsoft
Microsoft Bill Gates
miniaturization:
  mainframe, PC, PDA,
  portable, desktop
  computer etc.
miniaturize one computer
  for many users – one
  computer for one user
my first portable: an IBM
  Thinkpad
one user uses many
  computers: portable,
  PDA, cell phone, …
operating systems like
  OS/2 and Windows'
pc
pc 286
pc 386

pc 486
pc 486 Windows 3.1
pc AT
pc IBM PC my mom used
  WordPerfect
pc Pentium
pc Pentium 2/3/4
pc XT
Piccoline
portable – a cool invention
portable in backpack, as
  you go
printer development:
  Matrix/9-24 til ink/laser
  printers
punch cards
the computer invented in
  the USA, applied in the
  military
the first computer was as
  large as a room
the first computers were as
  large as a room
the desktop computer beco-
  ming prevalent in a few
  years
time sharing
Unix
window metaphor
Xerox
Xerox PARC
Xerox PARC

User Interface History
Researchers

"terminal"
3-D animation
Adobe
Alan Kay
Apple II
Ben Shneiderman
CHI conferences,
  especially in 1984
Command dialogue
Command doialogue still
  thrives in Linux
Control panels with
  switches by the hundred
Convergence between
  word-processing and
  desk-top publishing
CUA standard
Direct Manipulation
Displays
Displays
Donald Norman

Donals Norman's book
  Psychology of Everyday
  Things
DOS on the microcomputer
Function keys in
  WordPerfect & Word
Gould & Lewis paper in
  Comm. ACM 1985
  "Designing for
  Usability…"
Graphics in process control
  applications
GUI
GUI
homepages still only made
  by freaks
HTML metafor differs
  from GUI metafor
IBM 3270
IBM 3270
Internettet
Jakob Nielsen's Alertbox
Jef Raskin's Apple II user
  manuals
Jef Raskin's work on the
  Macintosh
John Seeley Brown's
  keynote at CHI '83
Macintosh
Microsoft's Office-suite
Online access, not only
  specialists
Patricia Wright's FLUID
  model
Punch card/tape as input,
  print/batch as output
punch tape
scripts – a kind of
  command language
switches
teletype
teletypes
the Mouse
the mouse
the mouse
the user as factor
thinking aloud test
typewriter
user frustrations

walk-up-and-use need
web not applicable to GUI
  interfaces, but is being
  used anyway
websites: surf to another if
  it doesn't work
wide application of home
  computers because of the
  graphical user interface
WIMP: Windows, Icons,
  Menus and Pointing
  Devices
Windows, especially
  Windows'95
WYSIWYG: What You
  See Is What You Get
Xerox PARC
Xerox Star

User Interface History
Students

Accessibility
Apple
Apple II
Browsers: Netscape,
  Explorer
Cognitive load
Colour displays
Command dialogue to
  graphics
Desktop metaphor
Desktop metaphor
DOS
DOS
Double click: learning
  problems
Douglas Engelbart: As We
  ..
Graphics vs. codes, easier
  for ordinary users
GUI and not UI
HTML: decide appearance
  yourself
IBM PC used by my mom,
  blue-white, cursor block
Iconic user interfaces
Icons

Intuition: my two-year old
  nephew could swith
  Windows XP on and off
Joystick, not keyboard on
  C64 game console
LINUX
LINUX: various Linux
  distros
Macintosh
Microsoft
Microsoft made the use of
  computers increase –
  early 1980s
Mobile devices
Operating systems
OS X
Piccoline – graphic
  interface
Software on mobile devices
Text-based – DOS
  Piccolone
Text-based interaction
User Interface & usability
  focus today vs. 1980s
User Interface term -
  invented by tech people –
  hard, interface better
User Interface: engineering
  paradigm – before the
  human aspect
Virtual Windows by Søren
  Lauesen
WIMP: Windows, Icons,
  Menus, Pointing devices
Windows 2000
Windows 3.1 lack of
  consistency
Windows 3.11
Windows 95
Windows 98
Windows ME
Windows various versions
Windows various versions
Windows XP
Word
WordPerfect's commands
WWW